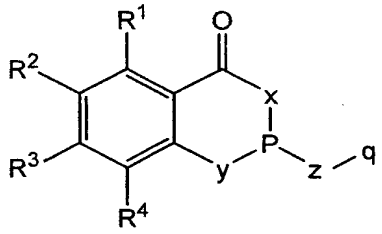
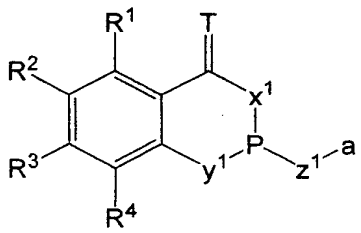
Claims:

1. A process for hydroformylating olefins, comprising the reaction of a monoolefin or a monoolefin mixture having from 2 to 25 carbon atoms with a mixture of carbon monoxide and hydrogen in the presence of a heteroacylphosphite of the general formula (1) or a corresponding complex with one or more metals of groups 4 to 10 of the Periodic Table of the Elements



(1)

where R^1, R^2, R^3, R^4 and q are the same or different and are each a substituted or unsubstituted aliphatic, alicyclic, aromatic, heteroaromatic, mixed aliphatic-alicyclic, mixed aliphatic-aromatic, heterocyclic, mixed aliphatic-heterocyclic hydrocarbon radical having from 1 to 70 carbon atoms, H, F, Cl, Br, I, $-CF_3$, $-CH_2(CF_2)_jCF_3$ where j = 0-9, $-OR^5$, $-COR^5$, $-CO_2R^5$, $-CO_2M$, $-SiR^5_3$, $-SR^5$, $-SO_2R^5$, $-SOR^5$, $-SO_3R^5$, $-SO_3M$, $-SO_2NR^5R^6$, $-NR^5R^6$, $-N{=}CR^5R^6$, where R^5 and R^6 are the same or different and are each as defined for R^1, and M is an alkali metal, formally half an alkaline earth metal ion, an ammonium or phosphonium ion, x, y, z are each independently O, NR^7, S, where R^7 is as defined for q, and x, y, z are not simultaneously O, with the proviso that when q has a radical which has a structural unit (6c)



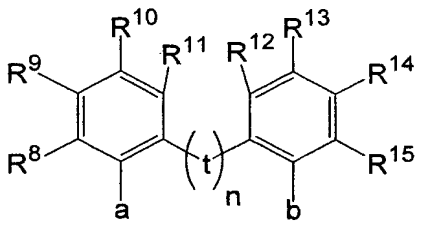
(6c)

where the R^1 to R^4 radicals are each as defined for formula (1), x^1, y^1, z^1 are each independently O, NR^7, S, where R^7 is as defined for q, T is an oxygen or an NR^{30} radical, where R^{30} is as defined for q, and the a position serves as the attachment point,
x and x^1 must not simultaneously be N and
x must not be N when T is NR^{30}.

2. The process as claimed in claim 1,
characterized in that
the R^1 and R^2, R^2 and R^3 and/or R^3 and R^4 radicals form a fused substituted or unsubstituted aromatic, heteroaromatic, aliphatic, mixed aromatic-aliphatic or mixed heteroaromatic-aliphatic ring system.

3. The process as claimed in claim 1 or 2,
characterized in that
the q radical consists of the W-R radicals where W is a divalent substituted or unsubstituted aliphatic, alicyclic, mixed aliphatic-alicyclic, heterocyclic, mixed aliphatic-heterocyclic, aromatic, heteroaromatic, mixed aliphatic-aromatic hydrocarbon radical having from 1 to 50 carbon atoms, and the R radical is $-OR^5$, $-NR^5R^6$, phosphite, phosphonite, phosphinite, phosphine or heteroacylphosphite of the formula (6c), where R^5 and R^6 are the same or different and are as defined for R^1.

4. The process as claimed in claim 3,
characterized in that
W is a radical of the general formula (2)



(2)

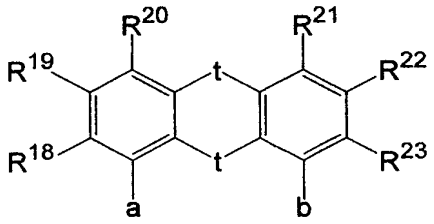
where R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} are the same or different and are each as

defined for R^1,

t is a divalent $CR^{16}R^{17}$, $SiR^{16}R^{17}$, NR^{16}, O or S radical, and R^{16} and R^{17} are each as defined for R^5 and R^6, n = 0 or 1 and the a and b positions serve as attachment points.

5. The process as claimed in claim 4,
characterized in that
in each case two adjacent R^9 to R^{15} radicals together form a fused substituted or unsubstituted, aromatic, heteroaromatic, aliphatic, mixed aromatic-aliphatic or mixed heteroaromatic-aliphatic ring system.

6. The process as claimed in claim 4,
characterized in that
W is a radical of the general formula (3):



(3)

where R^{18}, R^{19}, R^{20}, R^{21}, R^{22} and R^{23} are the same or different and are each as defined for R^1,

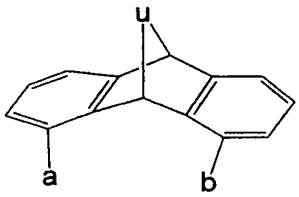
t is a divalent $CR^{16}R^{17}$, $SiR^{16}R^{17}$, NR^{16}, O or S radical, and R^{16} and R^{17} are each as defined for R^5 and R^6, n = 0 or 1 and the a and b positions serve as attachment points.

7. The process as claimed in claim 6,
characterized in that
in each case two adjacent R^{18} to R^{23} radicals together form a fused substituted or unsubstituted, aromatic, heteroaromatic, aliphatic, mixed aromatic-aliphatic or mixed heteroaromatic-aliphatic ring system.

8. The process as claimed in one of claims 3 to 7,

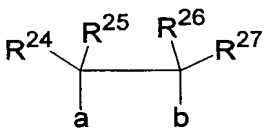
characterized in that

W is a radical of the general formula (4):

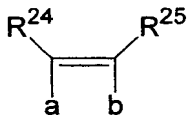


(4)

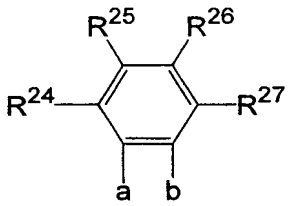
where u is a divalent group selected from radicals of the formulae (5a), (5b) and (5c)



(5a)



(5b)

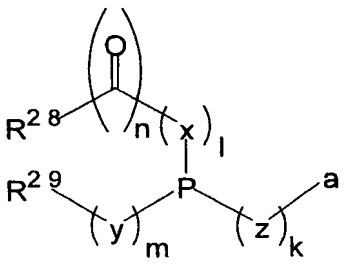


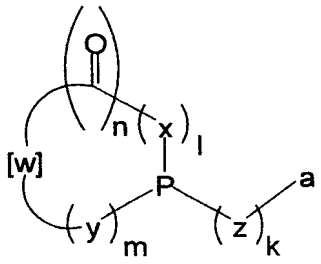
(5c)

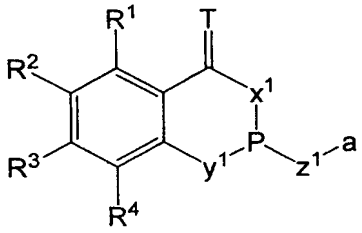
in which R^{24}, R^{25}, R^{26} and R^{27} are the same or different and are each as defined for R^1, and the a and b positions serve as attachment points.

9. The process as claimed in claim 8,
characterized in that
two adjacent R^{24} to R^{27} radicals together form a fused substituted or unsubstituted, aromatic, heteroaromatic, aliphatic, mixed aromatic-aliphatic or mixed heteroaromatic-aliphatic ring system.

10. The process as claimed in one of claims 3 to 9,
characterized in that
R represents radicals of the general formulae (6a), (6b) and (6c):


(6a)


(6b)


(6c)

where R^{28} and R^{29} are the same or different and are each as defined for R^1,
x, y, z and W are each defined as specified and
m = 0 or 1, n = 0 or 1, k = 0 or 1, l = 0 or 1,
and the position a serves as the attachment point.

11. The process as claimed in one of claims 1 to 10,
characterized in that
the metal of groups 4 to 10 of the Periodic Table is rhodium, platinum, palladium, cobalt or ruthenium.

12. The process as claimed in one of claims 1 to 11,
characterized in that
further phosphorus ligands are present.

13. A process for carbonylation, hydrocyanation, isomerization of olefins or amidocarbonylation in the presence of heteroacylphosphines of the formula (1) or metal complexes thereof, where R^1, R^2, R^3, R^4 and q are the same or different and are each a substituted or unsubstituted aliphatic, alicyclic, aromatic, heteroaromatic, mixed aliphatic-alicyclic, mixed aliphatic-aromatic, heterocyclic, mixed aliphatic-heterocyclic hydrocarbon radical having from 1 to 70 carbon atoms, H, F, Cl, Br, I, $-CF_3$, $-CH_2(CF_2)_jCF_3$ where j = 0-9, $-OR^5$, $-COR^5$, $-CO_2R^5$, $-CO_2M$, $-SiR^5_3$, $-SR^5$, $-SO_2R^5$, $-SOR^5$, $-SO_3R^5$, $-SO_3M$, $-SO_2NR^5R^6$, $-NR^5R^6$, $-N{=}CR^5R^6$, where R^5 and R^6 are the same or different and are each as defined for R^1, and M is an alkali metal ion, formally half an alkaline earth metal ion, an ammonium or phosphonium ion, x, y, z are each

independently O, NR^7, S, where R^7 is as defined for R^1.